PHILIPS

hi fi
HIGH FIDELITY INTERNATIONAL

PHILIPS N 7150

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Introduction
This HiFi stereo open reel recorder has, among others, the following features:
- Four motors:
- two DC-motors for driving both reel discs;
- one tacho-controlled DC-motor for driving the capstan;
- one DC-motor for the servo-control and the movement of the pressure roller.
- A pressure roller which retracts into the apparatus, so facilitating the insertion of the tape.
- A three-head system with full monitoring possibilities.
- A specification amply meeting the requirements of HiFi standard DIN 45 500.
- Four-track system.
- Three tape speeds, 19 - 9.5 - 4.75 cm/s.
- Servo-controlled tape transport buttons.
- Suitable for both horizontal and vertical positioning.
- Cueing possibility.
- Sound-on-sound (multiplay) recording.
- Possibility for echo recordings.

Controls and connection sockets

Front - fig. 1
① Reel spindles with rotatable lock
② Tape tension stabilisers
③ Control for cueing volume
④ Tape counter with zero reset button
⑤ Mains switch
⑥ Recording level controls, L/R = left/right channel
⑦ Output-level control for line-out and monitor sockets ㉚ ㉘
⑧ Volume control for headphone socket ㉓
⑨ Recording level meter for the left channel and tracks 1-4
⑩ Recording level peab indicator, for both channels
⑪ Recording level meter for the right channel and tracks 3-2
⑫ Input socket for the left channel microphone
⑬ Input socket for the right channel microphone
⑭ Tape speed selector
⑮ Track selector
⑯ Monitor selector and cueing switch
⑰ Record button with indicator
⑱ Play button
⑲ Pause button
⑳ Fast rewind button
㉑ Fast forward wind button
㉒ Stop button
㉓ Output socket for headphones

Rear side - fig. 2
㉔ Mains laid
㉕ Carrying handle
㉖ Type plate
㉗ Socket for remote control
㉘ Monitor sockets, L/R = left/right channel
㉙ Socket for sound-on-sound (multiplay) recordings
㉚ Line-out/monitor sockets, L/R = left/right channel
㉛ Line-in sockets, L/R = left/right channel

Connecting the recorder to the mains - fig. 2
Before connecting the recorder to the mains, check if the mains voltage as shown on type plate ㉖ corresponds to your local mains supply. If it does not, get your dealer or service organisation to adjust the voltage setting. The mains lead ㉔ may then be unwound and the mains plug inserted into the wall socket.
Important note for users in U.K.:
The version /15 (see type plate ㉖ is not fitted with a mains plug. When fitting a mains plug to the mains leads, proceed as follows: The wires in the mains lead are coloured in accordance with the following code: Blue = Neutral, Brown = Live. As these colours may not correspond with the colour markings identifying the terminals in your plug, proceed as fllows:
The Brown wire must be connected to the terminal which is marked with the letter L or coloured Red. The Blue wire must be connected to the terminal which is marked with the letter N or coloured Black.
Note: This apparatus must be protected by a 3 Amp fuse if a 13 Amp plug is used. If any other type of plug is used, by a 5 Amp fuse either in the plug or adaptor or at the distribution board. If in doubt, consult a qualified electrician.

Switching on and off
The recorder is switched on by pressing mains switch ⑤. Depending on the position of track selector ⑮, the recording level meters ⑨ or ⑪ or both will then light.
The recorder is switched off by pressing the mains switch ⑤ again. Ensure that the tape is brought to a standstill by pressing the stop button ㉒ before switching off the apparatus.

Inserting the tape - figs. 1 and 3
The recorder will accept either plastic or metal reels with a diameter up to 18 cm and is suited for use with tapes of thickness from 25 to 55 micron (1 micron 'µm' = 0.001 mm). Thus, in addition to ordinary Long-Play (LP) tape, Double-Play (DP) tape may also be employed. Triple-Play (TP) or Super-Long-Play tape of a thickness less than 25 micron is not recommended.
Threading the tape is very simple because in the stop position the pressure roller Ⓗ (fig. 9) retracts into the apparatus.
- The reels should be attached to the reel discs by placing them over the spindles ① and turning the top of the spindles 60 degrees (fig. 3). The reels are then firmly clamped to the discs.
- Attach a full reel of tape to the left-hand reel disc. This reel must turn anti-clockwise as the tape unwinds.
- Attach an empty reel to the right-hand reel disc. The diameter of the empty reel must be large enough to accomodate the entire tape from the full reel.
- Unwind about 30 cm of tape and lead it around the tape tension stabilisers ② and under the head cover (fig. 1).
- Lead the end of the tape between the flanges of the empty reel, draw a short piece through the threading slot in the flange, press the start of the tape against the reel and turn the reel anti-clockwise until it begins to take up the tape.

If the empty reel has no threading slot, insert the end of the tape between the flanges of the reel, press it against the inner side of the core and turn the reel anti-clockwise until it begins to take up the tape.
- Switch on the apparatus by pressing mains switch ⑤. Then press start button ⑱ and keep it depressed until the coloured leader tape and the metal switching foil have passed the switching contact Ⓖ (fig. 9), then press stop button ㉒.

Automatic stop
When the metal switching foil at the start and the end of the tape passes the switching contact Ⓖ (fig. 9), the motion of the tape is stopped and the depressed buttons are disengaged.
If tapes without metal switching foil are used, the depressed buttons will be disengaged after a few seconds by the integral tape-breakage protection mechanism.

Tape counter
Make a habit of setting the tape counter ④ to zero by pressing the zero reset button immediately after threading a tape. The counter reading at which each recording on the tape commences, may be noted on the index card of the tape storage box. Later, a recording can be swiftly located by fast forward winding or rewinding to the counter reading concerned.

Tape travel buttons
The tape travel buttons are of the 'tip touch' type and they control the mechanism via a servo motor, the so-called 'servo-control'. The incorporation of logic circuitry precludes wrongful operation and makes it possible to switch from one tape travel function to another without first pressing the stop button.

- The play button ⑱ sets the tape in motion for playback.
- For recording, record button ⑰ and play button ⑱ should be pressed at the same time. The indicator beside the record button will glow to indicate that the apparatus is in the recording mode.
- Using the pause button ⑲, recording and playback may be interrupted briefly without the record and play buttons being disengaged. The pause button itself can be disengaged by pressing it a second time.
- By pressing the stop button ㉒, recording, playback, fast forward winding and rewinding may be terminated and the corresponding buttons (except the pause button ⑲) disengaged.
- Fast forward winding and rewinding may be undertaken by pressing fast forward wind button ㉑ or fast rewind button ⑳.

Cueing (monitoring during fast winding/rewinding)
When monitor selector ⑯ is in position 'tape', the cueing function is switched on during fast forward winding, fast rewinding and in the play/pause position.
When cueing during fast winding or rewinding, the recorded sound is played back at the winding speed, so the recording will sound strange because of the increase in pitch. Some practice will soon enable a desired passage to be quickly recognised and located.
Cueing is also possible in the play/pause position, the reels then being turned by hand. In this way, a desired point may be located with great accuracy, for example the start of a word. This is a valuable feature when splicing together various sections of tape to form a composite recording.
The level of the cueing signal may be adjusted by turning cueing volume control ③. When turning this control to the left, the tape is brought nearer to the playback head, which increases the volume of the cueing signal. When turning this control to the right, the ape is brought farther from the playback head, which reduces the volume of the cueing signal.

Four-track system - fig. 4 and 5
This recorder allows four recordings to be made over the full width of the tape. The four recording tracks lie one above the other. Each tape can thus take four mono or two stereo recordings (a stereo recording consisting of two mono recordings).

Stereo - fig. 4
To make two stereo recordings on the four tracks, proceed as follows:
- Set track selector ⑮ to stereo 'ST'; both recording level meters ⑨ ⑪ will now light.
- Make the first stereo recording, which takes place on track 1 (left channel)and track 3 (right channe).
- When the right-hand reel is full, transpose the left and right-hand reels.
- Leave the track selector ⑮ set at stereo 'ST'.
- Make the second stereo recording, which takes place on track 4 (left channel) and track 2 (right channel).
- When the right-hand reel is full, all tracks over the full width of the tape have been recorded. DB

Mono - fig. 5
To make four mono recordings on the four tracks, proceed as follows:
- Set track selector ⑮ to '1-4'; recording level meter ⑨ will now liht.
- Make the first recording, which taes place on track 1.
- When the right-hand reel is full, transpose the left and right-hand reels.
- Leave the track selector ⑮ set at '1-4'.
- Make te second recording, which takes place on track 4.
- When the right-hand reel is full, transpose the left and right-hand reels.
- Set track selector ⑮ at '3-2'; recording level meter ⑪ ill now light.
- Make the third recording,which takes place on track 3.
- When the right-hand reel is full, tanspose the left and right-hand reels.
- Leave the track selector ⑮ set at '3-2'.
- Make the fourth recording, which takes place on track 2.
- When the right-hand reel is full, all tracks over the full width of the tape have been recorded.

Connections - figs. 1 and 2
For microphones, headphones and connecting leads, see chapter 'Optional accessories'.

Microphones - fig. 1
The unbalanced microphone inputs are designed for the connection of low-impedance microphones (50-2000 Ohms) fitted with 6.3 mm diameter mono jack plugs, so virtually any type of microphone, including electret, may be used.
- Input ⑫ is for the left channel microphone.
- Input ⑬ is for the right chanel microphone.

For mono recordings on one trck (track selector ⑮ at '1-4' or '3-2), the microphone may be connected to either of the inputs, or two mono signals will be recorded onto the same track.

Headphones - fig. 1
The headphone output socket ㉓ is for headphones ith a 6.3 mm diameter stereo jack plug and having an impedance between 8 and 2000 Ohms, thus virtually any type of headphone, including electret, may be employed.

Remote control - fig. 2
Remote socket 27 enables connection of a start/stop remote control unit fitted with a 5-pole 240° DIN plug, switch contacts to pins 1 and 5.
For remote control, switch on the ecorder and press the play button ⑱ (for playback) or the play button ⑱ and the recrd button ⑰ (for recording). The remote control thus allows the tape to be started and stopped during recording and playback.

Timer - fig. 2
When using the machine in conjunction with a timer which switches the mains supply, connect the mains plug to one of the mains outlets from the timer (switching power 23 W minimum). Press the mains switch ⑤ (the apparatus remaining in the switched-off state) and then the play button ⑱ (for playback) or the play button ⑱ together with the record button ⑰ (for recording). Once the starting time set on the timer has been reached, the recorder will start to play back or to record. Allowance should be made for the fact that a few seconds will elapse before the recorder attains the desired tape speed. If the recorder is also switched off by the timer, the depressed tape transport buttns will be released.

Connecting the recorder to a HiFi-syste - fig. 2
The recorder may be connected to an amplifier, pre-amplifier, receiver (combined tuner/amplifier), open-reel or cassette recorder et.
Use a connecting cable with four coaxial phono plugs at each end, for example: 4822 321 20381, length 50 cm;
4822 321 20382, length 250 cm.
- Connect the line-in sockets ㉛ of the recorder to the tape output sockets ('tape out' or 'rec out') of, e.g. the amplifier (fig. 2).
- Connect the line-out sockets ㉚ of the recorder to the tape input sockets ('tape in' or 'rec in') of the amplifier (fig. 2). EK

Always connect corresponding channels with one another, left to left ('L or 'left') and right to right ('R' or 'right').
The line-out sockets ㉚ are also monitor output sockets, which allow monitoring (source and tape) during recording. The line-out sockets ㉚ thus deliver an utput signal both during recording and playback.

Additional monitor sockets - fig. 2
The recorder is equipped with an additional pir of monitor sockets ㉘ which are switched in parallel with the line-out sockets ㉚ and therefore can be used for the same functions as the line-out

sockets. This may be useful when you want to record on two recorders at the same time: connect the second recorder to these monitor outputs.

Adjustable output level for the line-out and monitor sockets ㉚ ㉘
The output voltage of the line-out ㉚ and monitor ㉘ output sockets may be adjusted with the aid of line-out level control ⑦ so as to allow the recorer playback level to be adapted to that of other sound sources conneted to the amplifier, so that the playback volume of the recorder and for example the tuner is the same.

Monitoring during recording
During recording it is possible to monitor what is going onto the tape. This can be done either through headphones cnnected to socket ㉓ or via an amplifier connectd to the line-out ㉚ or monitor sockets ㉙.
Monitoring through headphones is of advantage when making microphone recordings since it averts the danger of the microphone —cking up sound from the loudspeakers and thus causing acoustic feedback, which is heard as a whistling or howling noise.
By means of monitor selector ⑯ the choice can be made between 'before tape' ('source') and 'after tape' ('tape') monitoring. The selector has a third position ('automatic') which is explained below.
- *Tape monitoring* (fig. 6A): during recording, the signal which the record head (Ⓓ) (fig. 9) has put on the tape, is reproduced immediately afterwards by the playback head Ⓔ. Thus what is the heard is the signal as recorded. Note that with the tape stationary (in the pause or stop position) the playback head gives no signal and so nothing is heard.
- *Source monitoring* (fig. 6B): in this case, what is heard is the signal as it sounds before the record head Ⓓ has put it on the tape, so the source signal will also be audible in the pause or stop position. Note that, when playing back a tape with monitor selector ⑯ in position 'source', you will not hear the tape recording, but the source signal.
- *Automatic monitoring:* When record button ⑰ is pressed, the set is automatically switched to source-monitoring. When the record button is not pressed (in position 'play' or 'play/pause'), the apparatus is in the tape-monitoring position.
Note that, with monitor selector ⑯ at 'tape', the cueing function is also operative (see chapter 'Cueing').

To monitor, proceed as follows:
- Connect headphones to socket ㉓ or connect an amplifier to the line-out sockets ㉚ or to the monitor sockets ㉘ and switch the amplifier for monitor playback.
- Set monitor selector ⑯ to 'source' if the tape is stationary or to 'tape' if the tape is running. For automatic switchover set the selector to 'automatic'.
- Adjust the volume for the headphones with control ⑧. When monitoring through an amplifier, the volume, balance etc. should be adjusted using the amplifier's own controls.

Introduction to recording
- Copying of gramophone records and recording of radio programmes is permissible only insofar as copyright or other rights of third parties are not thereby infringed.
Note for users in U.K.: Recording and Playback of material may require consent. See Copyright Act 1956 and The Performers' Protection Acts 1958 to 1972.
- The strength at which the sound is recorded on the tape (the 'recording level') determines the quality of the sound obtainable on playback. This recording level is adjusted with the recording level controls ⑥, the front control is for the right channel and the rear control for the left channel, so differences between the right and left channel may be corrected.
- The recording level is correctly set in position source-monitoring if, during the loudest passages, the pointers of recording level meters ⑨ ⑪ deflect to the '0 dB' mark and the peak indicator ⑩ lights from time to time (not continuously!). If the recording level is too high or too low, distortion or disturbing tape noise, respectively, will be heard on playback.
Note: Depending on the type of tape which is used, the indicated recording level obtained during tape-monitoring and playback may differ from the meter indication obtained during source-monitoring. However, in order to obtain optimum recording quality, the recording level should be set during source- monitoring.
- During recording, ay previous recording on the same part of the tape is automatically erased. You can, however, erase a recording without adding a new one by keeping the recording level controls ⑥ at '0' as you record. Erasure is fastest with tape speed selector ⑭ at 19 cm/s.
- During the making of microphone recordings, the apparatus connected to the line-in sockets ㉛ must be disconnected or switched off. During the making of recordings from the line-in sockets ㉛, no microphones must be connected. This is to avoid unwanted mixing of signals.

Recording
- Connect the equipment from which you wish to record to the appropriate socket(s), see chapter 'Connections'.
- Set track selector ⑮ to stereo 'ST' or - for mono recordings - to '1-4' or '3-2', see chapter 'Four-track system'.
- Set tape speed selector ⑭ to the tape speed desired. The lowest speed gives the longest playing time, the highest speed the best sound quality.
- Set monitor selector ⑯ to 'source' or 'automatic'.
- Press pause button ⑲.
- Press record button ⑰ and play button ⑱ at the same time. The indicator near the record button will now light.
- Allow the equipment connected to play, or speak or sing into the microphones and adjust the recording level and the balance between both channels with the recording level controls ⑥ in such a way that, during the loudest passages, the pointers of the recording level meters ⑨ ⑪ deflect just to the '0 dB'-mark and the recording level peak indicator ⑩ lights from time to time (not continuously!). Monitor selector ⑯ must be in position 'source' or 'automatic'.
- Now start making the actual recording by pressing the pause button ⑲ once more. You can also start a recording without using the pause button by simply epressing the record ⑰ and play button ⑱ at the same time and adjusting the recording level during the recording (source-monitoring). The sound may also be faded-in by turning the recording level controls ⑥ from '0' to the desired setting after the tape has been set in motion.
- The signal before and after recording can be compared at any time with the original signal by monitoring either through headphones or through the amplifier connected. The original signal is heard with monitor selector ⑯ at 'source' or 'automatic' (source-monitoring), and the signal as recorded with the monitor selector at 'tape' (tape-monitoring).
- Check the recording level from time to time in position source-monitoring and readjust it, gradually, as necessay with the recording level controls ⑥.
- For brief interruptions, press pause button ⑲. To resume recording, simply press the pause button again.
- To stop recording, press stop button ㉒. If it is wished to fade-out the sound, turn the recording levelcontrols ⑥ slowly back to '0' before pressing the stop button.

Playback
- Set track selector ⑮ to the position it was in during recording.
- Set tape speed selector ⑭ to the position it was in during recording.
- Set monitor selector ⑯ to 'tape' or 'automatic'.
- Adjust the amplifier for 'tape'-playback or connect headphones to socket ㉓.
- Start playing back by pressing play button ⑱.
- Adjust the volume for the headphones with control ⑧ or, when playback is through an amplifier, adjust the volume, balance, tone etc. using the amplifier controls.

- To stop playback, press stop button ㉒.

Sound-on-sound (multiplay) recordings
It is possible with this facility to make several different recordings which may be synchronised and combined with each other to form a single recording on one track. It is therefore possible to make a recording of, say, a quartet in which all the instruments are played by the same person.
To make a sound-on-sound recording with, say, a microphone, proceed as follows:

First recording - fig. 7A
- Connect a microphone to socket ⑫.
- Set tape speed selector ⑭ preferably to the highest tape speed.
- Set tape counter ④ to zero by pressing the zero reset button.
- Set track selector ⑮ to '1-4'.
- Make a normal mono recording on track 1 of e.g. the drum accompaniment.

Second recording - fig. 7A
- Rewind the tape to the zero-position of tape counter ④.
- Connect headphones to socket ㉓.
- Set monitor selector ⑯ to 'source' or 'automatic' and let it remain in this position during recording.
- Set track selector ⑮ to '3-2'.
- Connect with the aid of an additional connecting lead the right line input socket ㉛ to the sound-on-sound (multiplay) socket ㉙ (fig. 2).

In fact you will make a mixed recording on track 3, consisting of the second microphone recording of e.g. the trumpet and the first microphone recording of the drum, which will be transferred from track 1 to track 3.
During the second recording, you will hear the first (drum) recording through the headphones, so the second (trumpet) recording will be synchronised with the drum accompaniment.
The recording level of the new microphone recording should be adjusted with the left recording level control ⑥ and the level of the signal being transferred from track 1 to track 3 can be adjusted with the right recording level control ⑥.
- Set the recording level of the new microphone recording lower than normal, because the signal to be transferred will be added to this. During recording, the mixing ratio can be monitored by headphones and if necessary corrected with the controls ⑥ and ⑦. The illuminated recording level meter indicates the sum of the two signals and must be adjusted in the normal way as stated in chapter 'Recording'.
- Now make the new (trumpet) recording, adding th old (drum) recording to it, on track 3.
- If the second recording is unsatisfactory, it may be remade since the preceding recording on track 1 has not been erased.

Third recording - fig. 7A
- Rewind the tape to the zero position of the tape counter ④.
- Set track selector ⑮ to '1-4'.
- Proceed further as indicated under 'Second recording', making the new recording and adding the earlier recordings, on track 1.

Proceed with further recordings in the same way. Do not forget to move the track selector ⑮ to the other track position before making each recording. Note that for the second, third and subsequent recordings the monitor selector ⑯ must stay at either 'source' or 'automatic'.
If the last recording is unsatisfactory, it may be remade again and again, since the preceding recording had not been erased.
Theoretically, this process could be continued indefinitely, but transfer loss (the progressive deterioration in the quality of sound with each copy made of a recording) imposes limits in practice. To keep loss to a minimum, the highest tape speed should be used and the most important instrument or voice part recorded last of all.
When a sound-on-sound recording is finished, always remove the plug from the sound-on-sound socket ㉙.

Playback of a sound-on-sound recording - fig. 7B
Playback of a sound-on-sound recording takes place in the normal way with the track selector ⑮ in the position last used. The second last recording can, if desired, be erased or it may be replaced by another mono recording.

Echo recordings - fig. 8
Recordings with echo may be made with this recorder, due to the fact that the apparatus is equipped with separate heads, mounted in line, for recording and playback. In the making of a recording with echo, the signal just recorded on the tape by the record head Ⓓ (fig. 9) is reproduced immediately by the playback head Ⓔ, returned to the record head and then recorded together with the original signal (fig. 8).
The echo effect is made possible by the fact that the two heads are a finite distance apart, and its character is influenced by the tape speed. At the relatively low speeds of 4.75 and 9.5 cm/s, a slow echo is obtained, whilst at the high speed of 19 cm/s, a rapid echo (reverberation) is obtained.
An echo recording is in fact a mixed recording, and the mixing ratio between the echo signal and the original signal can be adjusted. Echo recordings can be made in stereo and mono alike, but only through the microphone inputs ⑫ ⑬.
- Connect the microphones to the inputs ⑫ ⑬.
- Interconnect the line-out sockets ㉚ or the monitor sockets ㉘ with the line-in sockets ㉛, using a suited connecting lead.
- Set the tape speed selector ⑭ to the speed desired.
- During echo recordings, monitor selector ⑯ must stay in position 'tape'.
- The recording level is adjusted with the recording level controls ⑥ and the line-out level control ⑦. Set the recording level of the microphone signal to a lower value than normal, since the echo signal is added to this during recording.
- Start the recording. When monitoring through headphones, you can adjust the mixing ratio between the microphone signal and the echo signal with the recording level controls ⑥ and the line-out level control ⑦. The recording level meters indicate the sum of both signals and the level may further be adjusted as indicated in chapter 'Recording'.

Maintenance
It is advisable to remove at regular intervals the dust and dirt from the magnetic heads and other parts with which the tape comes into contact. This should be done after about every 50 hours of operation, which, in normal circumstances, will be about once per month.
Use a soft cloth or cotton bud lightly moistened with alcohol, methylated spirit or a fluid specially made for this purpose. Use no materials other than these and avoid touching the heads with sharp or metallic objects.
Clean the tape tension stabilisers ②, the front of erase head Ⓑ (fig. 9), record head Ⓓ, playback head Ⓔ, the tape guides Ⓐ, the pins Ⓒ, the capstan Ⓕ, the switching contact Ⓖ and the rubber sides of the pressure roller Ⓗ (for this, switch the recorder in the play/pause position without any tape inserted).
After cleaning, rub the heads Ⓑ Ⓓ Ⓔ with a dry cloth.

Do not lubricate the apparatus. It is recommended that the machine is checked by a service engineer about once per year.

Technical data
Subject to change without notice
- Adjustable by your dealer for mains voltages of 110, 127, 220, and 240 V.
- Suitable without switching for 50 and 60 Hz A.C.
- Power consumption approx. 23 W.
- Four-track system.
- Suitable for reels up to 18 cm.
- Permissible tape thickness 25 to 55 micron (µm).
- Frequency range according to DIN 45 500:

19 cms: 35-25 000 Hz;
9,5 cm/s: 35-18 000 Hz;

4.75 cm/s: 35-12 500 Hz.
- Signal-to-noise ratio, according to DIN 45 500 and NAB, weighted/curve A, D = 3%:
19 cm/s: > 62 dB;
9.5 cm/s: > 60 dB;
4.75 cm/s: > 56 dB.
- Signal-to-noise ratio, DIN, unweighted, D = 3%, for all speeds: > 48 dB.
- Wow and flutter, according to DIN 45 500, weighted:
19 cm/s: < 0.10%;
9.5 cm/s: < 0.15%;
4.75 cm/s: < 0.20%.
- Maximum deviation from the nominal tape speed, for all speeds: ± 1%.
- Fast winding/rewinding time for LP 18 (540 m): ≤ 180 s.
- Crosstalk (channel separation) at 1 kHz: ≥ 40 dB.
- Track separation:
at 1 kHz: > 60 dB;
at 35-200 Hz: ≥ 35 dB.
- Equalisation:
19 cm/s: 3180 + 50 µs;
9.5 cm/s: 3180 + 90 µs;
4.75 cm/s: 3180 + 120 µs.
- Bias and erase frequency: 100 kHz ± 10%.
- Mechanical noise: < 37 dBA((ISO noise curve 30).
- ⑫ ⑬ - unbalanced microphone inputs for low-impedance (50-2000 Ω) microphones. Input sensitivity 0.3 mV/2 kΩ.
- ㉓ - Headphone output socket for headphones having an impedance between 8 and 2000 Ω. Maxium output voltage 3 V/ 600 Ω.
- ㉗ - Remote control socket, start/stop breakcontact between pins 1 and 5.
- ㉙ - Sound-on-sound socket.
- ㉘ ㉚ - Monitor and line-out sockets, adjustable output voltage 1 V/5-10 kΩ; load impedance ≥ 50 kΩ.
- ㉛ - Line-in sockets, input sensitivity 50 mV/68 kΩ.
- Dimensions, width × height × depth: 390 × 390 × 210 mm approx.
- Weight: 8 kg approx.

Optional accessories
The accessories listed below may be obtained fom your dealer.
Note: Some accessories may not be available in all countries.

Tapes etc.
- LP 13-15-18, High Output HiFi long-play tape on metal-look plastic reels, diameters respectively 13 cm (270 m of tape), 15 cm (360 m of tape) and 18 cm (540 m of tape).
- DP 13-15-18, High Output HiFi long-play tape on metal-look plastic reels, diameters respectively 13 cm (360 m of tape), 15 cm (540 m of tape) and 18 cm (720 m of tape).
- ER 13-15-18 ML, empty mtal-look plastic reels, diameter, respectively 13, 15 and 18 cm.
- SK 10, tape splicing kit.

Microphones
- N 8215, omni-directional electret HiFi microphone with jack plug and detachable table stand. Sensitivity 2.5 mV/Pa, frequency range 50-18 000 Hz (− 6 dB), impedance 800 Ω.
- N 8310/02, omni-directional electret HiFi microphone with jack plug and detachable table stand, fitted with wind shield and adapter for floor stand with 3/8″ Whitworth thread, all packed in a storage cassette. Sensitivity 3 mV/Pa, frequency rage 20-20 000 Hz (− 6 dB), impedance 800 Ω.
- N 8501/02, uni-directional (cardioid) electret HiFi microphone with jack plug and detachable table stand, fitted with wind shield and adapter for floor stand with 3/8″ Whitworth thread, all packed in a storage cassette. Sensitivity 3.5 mV/Pa, frequency range 50-18 000 Hz (− 6dB), impedance 1200 Ω.
- N 8404/02, HiFi stereo microphone pair, comprising two omni-directional electret HiFi microphones, each with jack plug, with two table stands packed in a storage box. Sensitivity 2,5 mV/Pa, frequency range 50-18 000 Hz, (− 6dB), impedance 800 Ω (all per channel).
- N 8410, deluxe HiFi stereo microphone pair, comprising two uni-directional (cardioid) electret HiFi microphones, each with jack plug, windshield and adjustable microphone clamp, with several accessories for table and floor stand mounting (3/8″ Whitworth thread), all packed in a deluxe storage case. Sensitivity 3.5 mV/Pa, frequency range 50-18 000 Hz(− 6 dB), impedance 1200 Ω (all per channel).

Headphones
- N 6330/02, HiFi stereo headphones with stereo jack plug, equipped with 12 auxiliary diaphragms for extreme spatial effect. Frequency range 16-20 000 Hz, impedance 2 × 600 Ω, weight 400 g.
- N 6321, HiFi stereo electret headphones with stereo jack plug. Frequency range 20-22 000 Hz, weight approx. 350 g.
- N 6326, HiFi stereo electrt headphones with stereo jack plug. Frequency range 20-2 000 Hz, weight approx. 350 g.

Additional accessories
- AH 080, timer.
- N 6605, transparent dust protection cover.
- LFD 3414, remote control unit for starting and stopping the tape during recording and playback.

Connection, extension and adapter leads

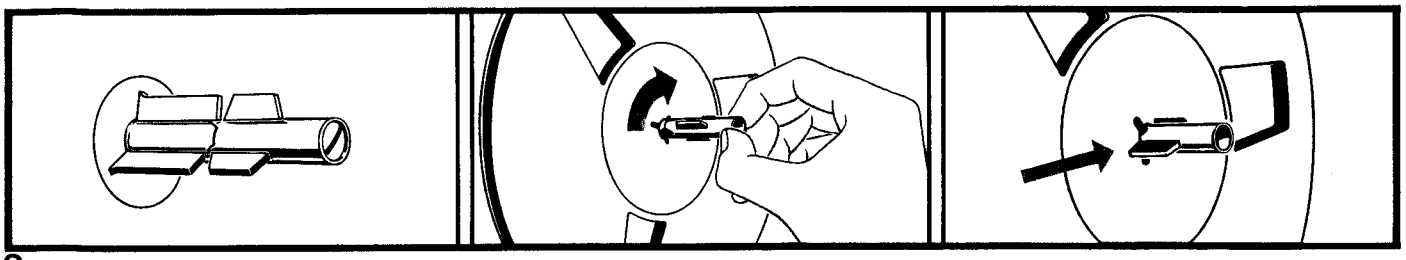
For microphones
- 4822 321 20364, mono extension lead, length 500 cm. With mono jack socket connector and mono jack plug.
- 4822 321 20367, adapter lead, length 15 cm, for connecting microphones with 3-pole 180° mono DIN plug. With 5-pole mono DIN socket connector and mono jack plug.
- 4822 321 20368, adapter lead,length 15 cm, for connecting stereo microphones with 5-pole 180° stereo DIN plug. With one 5-pole stereo DIN socket connector and two mono jack plugs.

For headphones
- 4822 321 20316, stereo extension lead, length 500 cm. With stereo jack socket conector and stereo jack plug.
- 4822 321 20291, adapter lead, length 15 cm, for connecting headphones with stereo DIN die-5 plug. With stereo DIN die-5 socket connector and stereo jack plug.

With coaxial phono plug.
Connecting leads with four coaxial phono plugs at both ends:
4822 321 20381, length 50 cm;
4822 321 20382, length 250 cm.
- 4822 321 20383, extension lead, length 250 cm. With four coaxial phono socket connectors and four coaxial phono plugs.
- 4822 321 20308, connecting lead, length 250 cm. With two coaxial phono plus at both ends.
- 4822 321 20307, extension lead, length 250 cm. With two coaxial phono socket connectors and two coaxial phono plugs.

With coaxial phono and 5-ole 180° DIN plugs
- Connecting leads with four coaxial phono plugs and one 5-pole 180° stereo DIN plug.:
4822 32 20189, length 120 cm;
4822 321 20198, length 120 cm, with attenuating resistors (1 MΩ) on pins 1 and 4.

Plugs for remote control (pins 1 and 5)
- 4822 264 40024, 5-pole 240° DIN plug.
- 4822 264 40027, 5-pole 240° DIN angled plug.



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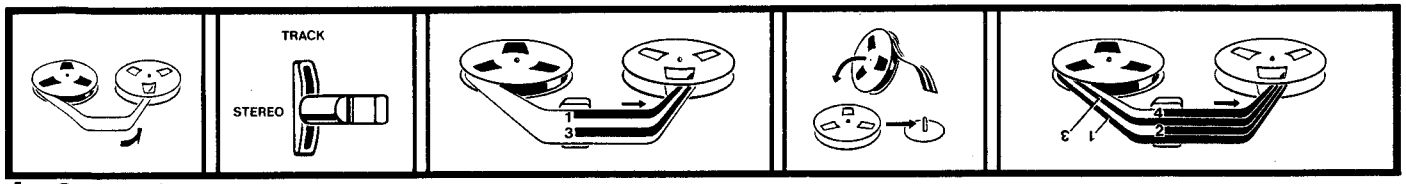
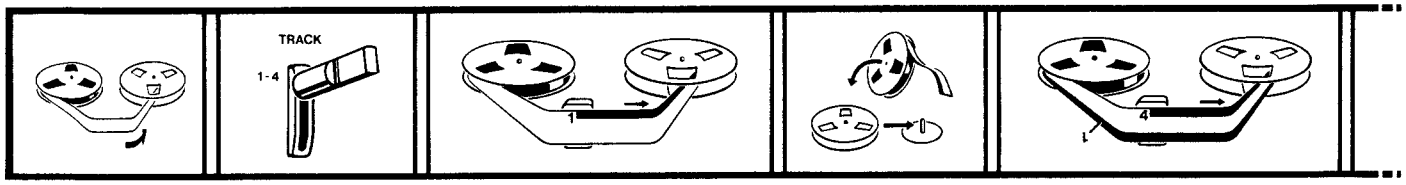
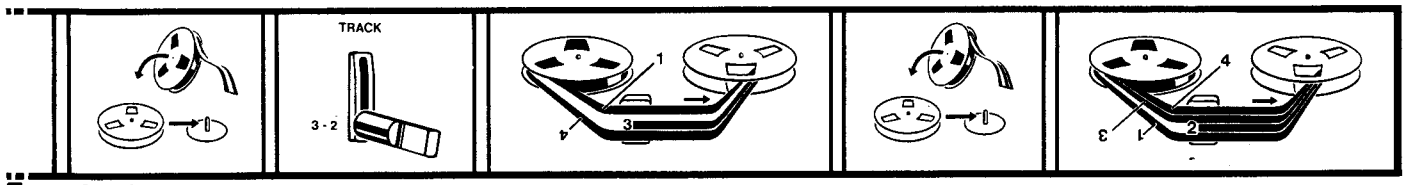
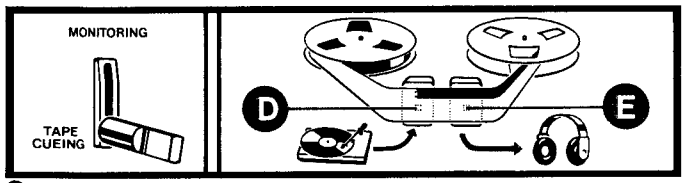


4 STEREO

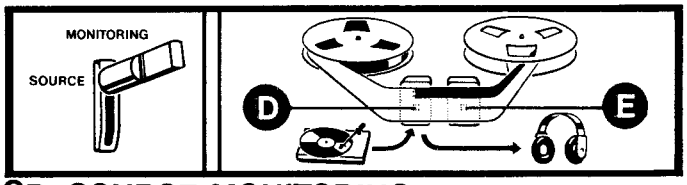




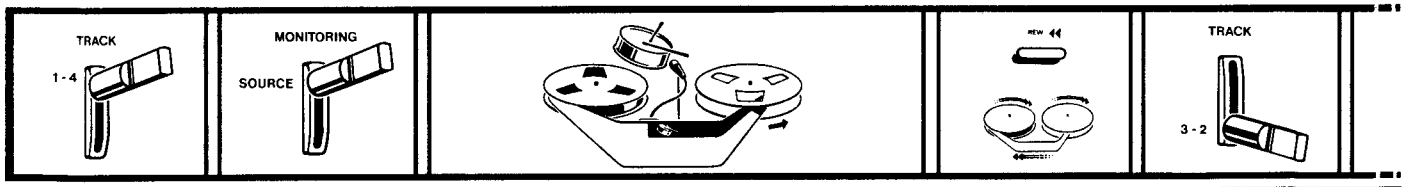
5 MONO

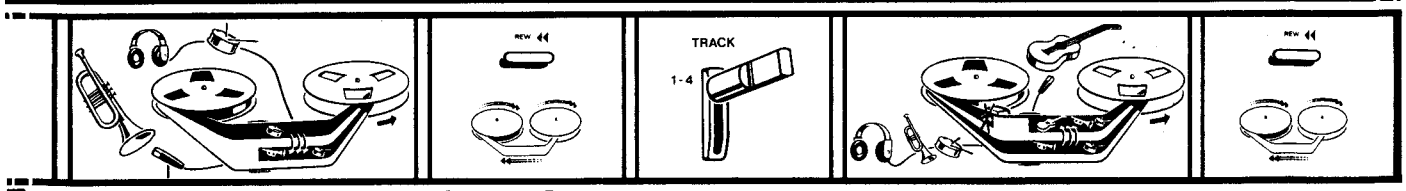


6A TAPE MONITORING

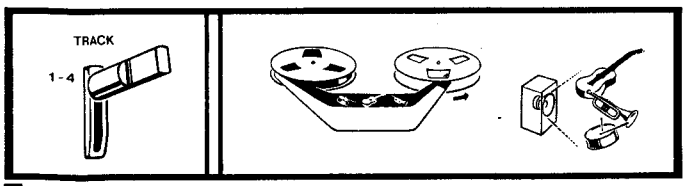


6B SOURCE MONITORING



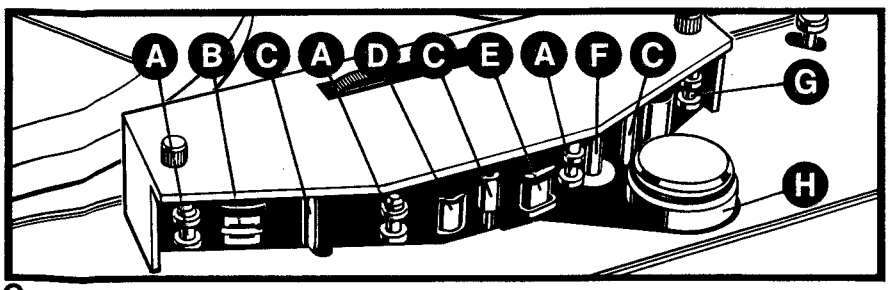


7A SOUND ON SOUND RECORDING



7B SOUND ON SOUND PLAYBACK

8 ECHO



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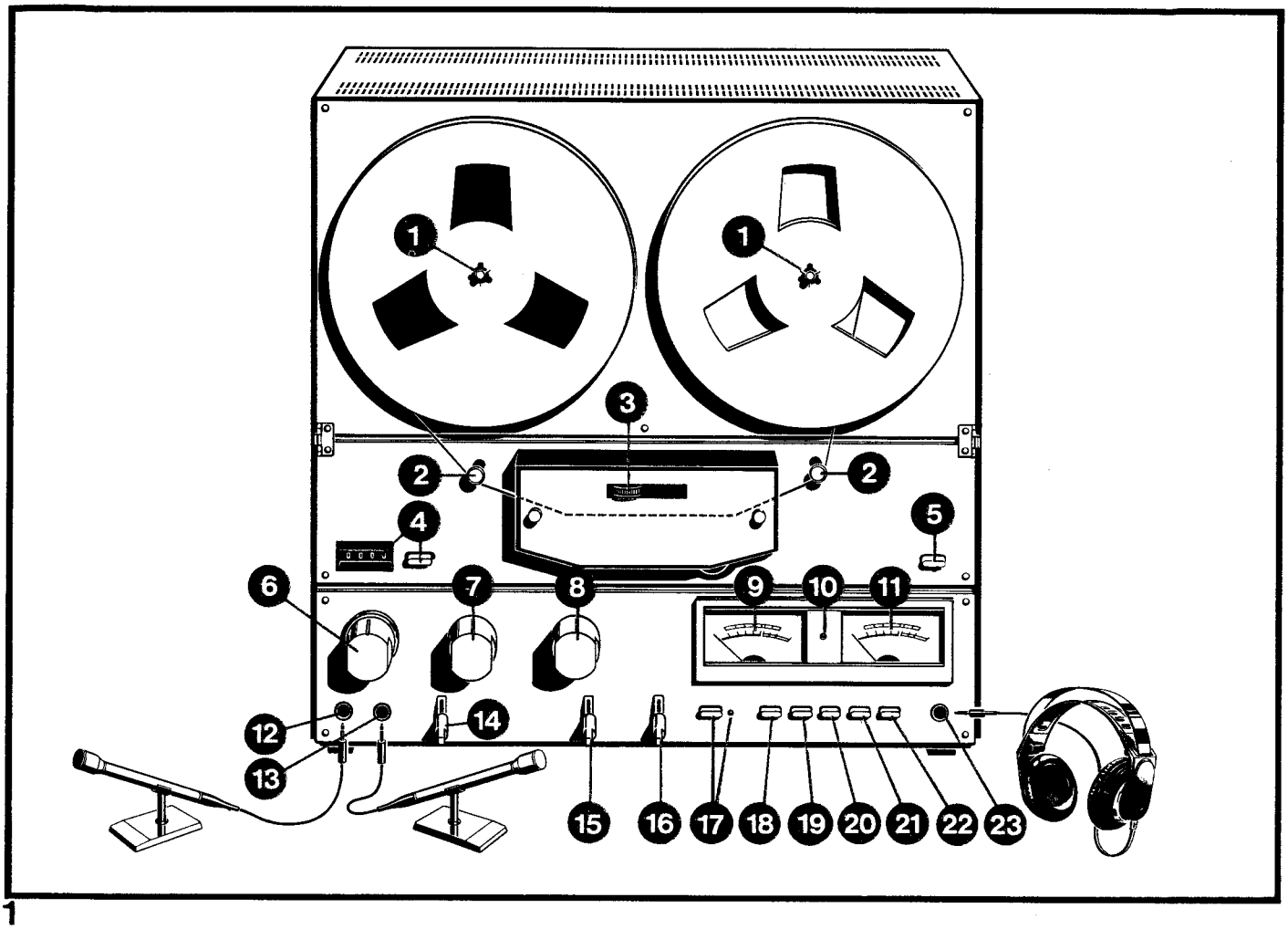
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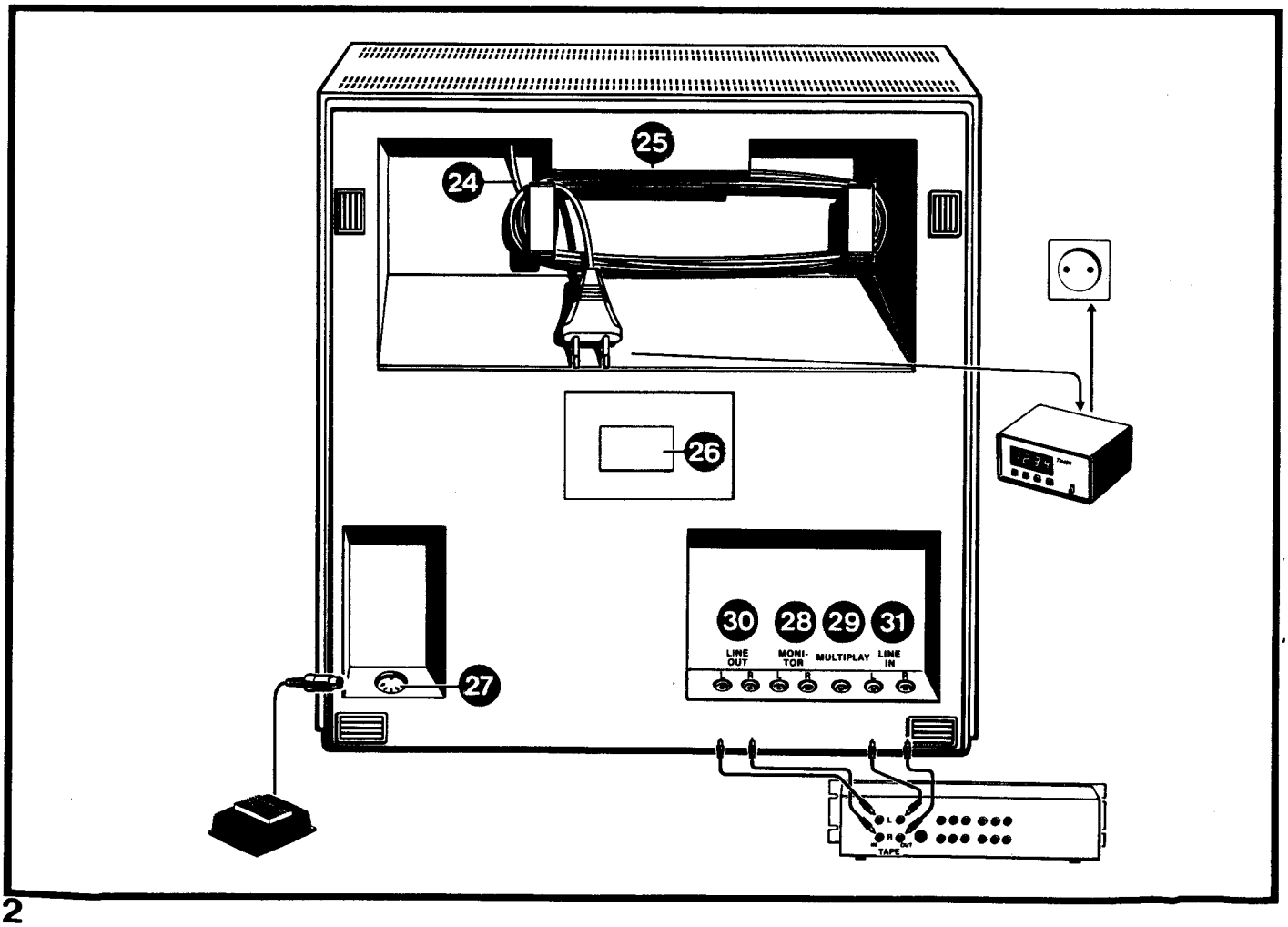
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LINE OUT
MONI-TOR
MULTIPLAY
LINE IN
TAPE

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